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ELECTRICAL REVIEW

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VIEWS, NEWS AND INTERVIEWS.

It is reported that lightning has been known to strike upward as well as downward. A recent writer on the subject reports a case that occurred at Manchester, England, in August, 1888, where the bolt was distinctly seen to strike the base of a large cast-iron chimney and then to take an upward slant, burning a crooked river in the metal from the point of contact to the top, where it escaped into the atmosphere and exploded in the manner of an immense fire ball. At Monticello, Ia,, on June 21, 1893, a tree near the residence of G. H. George was struck by a lightning flash and torn in a manner which clearly indicated that the current had passed upward from the earth. The director of the Iowa Weather Service Corps reports that while upward lightning strokes are reckoned as freaks and phenomena by the laymen, they are not of infrequent occurrence, and have often been reported by meteorological observers. In one or two of the Solomon Islands and at several places on the Indian Ocean coast of Africa the upward stroke is said to be the rule and the downward the exception.

Since the introduction of trolley cars in Brooklyn, N. Y., horses can be bought very cheap in some of the car stables. Not long ago a lot were auctioned off and a peddler is said to have paid 75 cents for a bony animal which, though it was a skeleton, was driven away at a six-mile-an-hour gait.

A team pulling a loaded farmer's wagon on the way to the Wallabout Market went slowly along the car tracks in Broadway, Williamsburgh, N. Y., the other night. The driver was asleep. A car came up behind the wagon. The motorman pounded the gong vigorously. The team turned out of the tracks while the driver kept on slumbering. When the car passed the team returned to the tracks. "You can see that every night," said a policeman. "The teams are just as intelligent as the driver himself. When once the farmer reaches Broadway and he knows he has an intelligent team, he feels safe and goes to sleep. The horses know the ring of the trolley cars and know just what it means."

The real estate in Paris belonging to Dr. Cornelius Herz, of Panama Canal notoriety, and the founder of *La Lumiere Electrique*, was sold at auction last Wednesday. The property was divided into 16 lots, 14 of which realized an aggregate of 1,348,000 francs.

One can still see occasionally an old man or woman troubled with rheumatism pick up the discarded ends of electric light carbons and carefully preserve them. The belief is that the carbon, if carried in the pocket, will cure rheumatism.

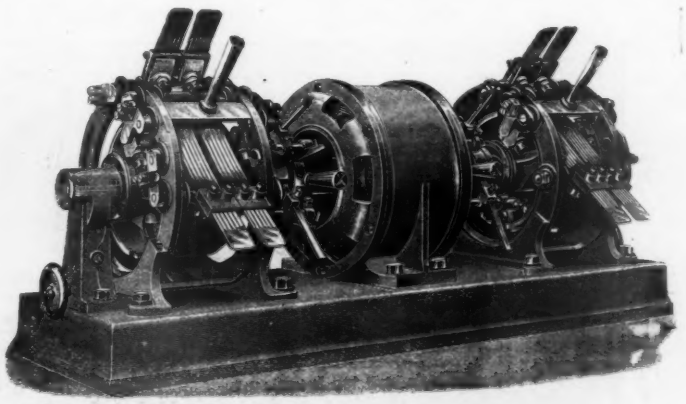
In the course of a recent letter, Prof. George Forbes speaks of the Niagara Falls power transmission scheme as follows: "It is difficult for me to say who are the bolder, the capitalists who are embarking into the scheme or the manufacturers who are moving their factories before a single result has been achieved. The action of both is typical American, and their confidence was not misplaced, as the success of the scheme is now assured."

Williamsport, Pa., is to have a new electric light plant.

Ferranti Rectifiers at the Cardiff Electric Lighting Station.

In an article in London *Engineering*, describing a new electric lighting station recently installed at Cardiff, the following description of the Ferranti rectifier is given:

There are four Siemens alternators in the station, each with its exciter on its own shaft. The two large ones have each an output of 180 kilowatts, giving 72 amperes at 2,500 volts, with a frequency of 40 complete periods per second. They are of the usual type of Siemens W machines, with 36 bobbins; the armature rotates and has no iron in the coils. The exciter is Siemens H B 15x10 continuous current dynamo, with a bar armature designed for 100 amperes at 45 volts.



Ferranti Rectifier in the Central Electric Lighting Station at Cardiff.

The two small alternators have an output of 40 kilowatts each, giving 16 amperes at 2,500 volts. The corresponding exciters are Siemens H B 12x8 dynamos, wound for 65 amperes at 45 volts.

For some time to come the principal load on the station will be the lighting of the public streets, as but few of the inhabitants of the town have got their premises wired in readiness for the introduction of the current. Forty-eight arc lamps have been erected on cast-iron posts, generally in the center of the street, the height of focus of the arc being 22 feet. As the alternate current is not considered by some satisfactory for arc lamps, it is changed into a uni-directional pulsating current by means of Ferranti rectifiers, one of which is shown in the accompanying illustration. Cardiff was the first town to decide upon the use of a rectified current, although, in consequence of delays, rectifiers were actually got to work at Portsmouth during last Summer. Some of the rectifiers for Cardiff were delivered about a year ago, and were exhibited at the opening of the South Wales Institute new buildings early in January, 1894. That was the first time rectifiers were publicly shown in England. Their adoption at Cardiff was the outcome of a corporation trip to Frankfort more than three years ago, when Mr. Alderman Carey (now Mayor of Cardiff) saw a Shuckert machine giving both direct and alternate currents and working as a motor with either. The noticeable feature at Cardiff is that the rectifiers are placed over a mile from the station, and thus save the numerous long lengths of cable that would be required to serve the separate circuits of 12 lamps each. There is also an economy in transmitting current at 2,500 volts instead of 600 volts, although the advantages of the lower pressure are retained for the circuits themselves.

The current supplied to the rectifier passes through a transformer which gives out a uniform current at a potential that varies with the load. In this transformer there are three coils. The middle coil is fixed, while the upper and lower coils are movable, and their weight is nearly balanced by a counterpoise on a lever. When no current passes through the middle coil, or when the circuit of the two outer coils, which form the secondary coil, is open, the weight of the counterpoise causes the two coils to come into contact with the center one. But if the secondary circuit is closed by a number of arc lamps in series, and an alternating current be sent through the middle coil, the secondary induced current will be repelled by the primary current, and the movable coils will be pushed away from the middle coil, until the electro-magnetic force just balances the difference between their weight and that of the counterpoise. In this position there will be just sufficient magnetic induction to induce in the outer coils such an electro-motive force as will develop the requisite current in the arc circuit.

The uniform current of 12 amperes is passed through the Ferranti rectifier, which comprises a synchronous, self-starting, alternating current motor, fitted with a commutator for rectifying the current to excite its own field magnet, and also at each end of the spindle with a special form of commutator for rectifying the current for the arc lamps. The motor is

started by cutting out a regulating resistance and putting a starting resistance of 10 ohms in circuit with the field through the small commutator. When the motor comes up into step the 10 ohms are cut out, and the regulating resistance is put in to reduce the volts on the terminals of the motor until it runs steadily. Each motor drives two commutators of four parts each, with intervening strips to break up the spark at the point of commutation.

The lamps are of Siemens' "Band" type, slightly modified to adapt them for working in series. They are arranged in four series of 12 each.

LETTERS FROM OUR FRIENDS.

ENJOYS OUR POKING FUN—COMPLIMENTS A CORRESPONDENT.

To the Editor—the Sarcastic Editor—of Electrical Review:

Why can't you let the *Electrical World* die in peace? "Chicory-tinted" is bad enough—but "the few readers that really do pay for it"—that's enough to rip 'em up the back. Aren't you satisfied to own all the United States courts and thus secure the *first* publication without rubbing salt into the wounds of your back number contemporaries? Go to.

"Telephonist" from Boston, in the same issue, is the writer who does it right—few words, to the point and a world of information.

Wish you a Merry Christmas and happy and prosperous New Year.

New Jersey, December 26. S.

KIND WORDS FROM A TELEPHONITE.

To the Editor of Electrical Review:

The telephone articles you publish are quite welcome to many electrical people. I desire to state, as I have stated previously, that for telephonists there is only one American electrical journal that satisfies their needs, and that is the Electrical Review. It is the first paper telephone people desire to read, because it contains the best and most valuable telephoue articles and general information.

Yours faithfully, M.

Boston, December 27, 1894.

"PUSH."

To the Editor of Electrical Review:

I only gave you the copy for my advertisement Saturday afternoon, and it was a surprise to me to receive the Electrical Review by 4 P. M. to-day (Monday) with the card in it. This shows *push*. Wishing you the compliments of the season, I am,

Very truly yours,

J. W. Godfrey,

15 Cortlandt street, N. Y., December 24, 1894.

New York Board of Electrical Control.

The Board of Electrical Control held its final meeting for the year 1894 in the Mayor's office last Friday. Secretary Kearney reported that during 1893 and 1894 2,731 poles and 3,008 miles of wire had been removed. During the existence of the Board 20,003 poles and 26,328 miles of wire had been removed. There were still many wires illegally strung, and the District Attorney had been requested to prosecute those maintaining them.

The Electric Locomotives For The Baltimore Tunnel.

The event for which electricians throughout this country are waiting with impatient interest—the operation of passenger and freight trains in the belt line tunnel of the Baltimore and Ohio Railroad, at Baltimore, by locomotives in which the sole propulsive power will be electricity, is now nearing realization. Work has been progressing steadily lately at the works of the General Electric Company, both upon the generating plant and the locomotives, and the early part of this new year will probably see the huge locomotives handling the long trains with the ease for which they are designed. This experiment will be the first practical step in this country toward the subjection of the steam trunk railroad to electricity. Two comparatively small locomotives, one of 30 tons and the other of 40 tons on the drivers, are already running, but not upon any important lines, and while perfectly successful their operation gives but little clue to the outcome of the practical tests on the Baltimore and Ohio road. The delay that has occurred in the completion of the work has been of advantage in that it has allowed of the embodiment in this apparatus of all the recent improvements in electric railway practice.

Fig. 1.—End View of One of the Baltimore and Ohio Railroad's Electric Locomotives.

The trucks are of forged iron, each resting upon four driving wheels of cast steel, 62 inches in diameter. Flexibly supported upon each of these trucks are two six pole gearless motors, one for each axle, transmitting their motion from the armatures to the wheels by means of an especially designed flexible coupling. The method of spring suspension has been carefully modified to allow of the immediate adjustment of the wheels to the irregularities of the tracks, and thus effect a diminution in the wear both to the motors and the track. The massive armatures are of the ironclad type. A hollow shaft serves to carry the armature, and through this passes the wheel axle, to which it is connected by the universal coupling already mentioned, which allows of freedom of movement in any direction.

The complete motors are the largest railway motors in the world, and while ponderous in appearance are by no means so bulky as might be expected from the heavy duty they will be called upon to perform. They are so set on the truck that they will be easy of access under all circumstances, whether the locomotive is at a standstill or in motion.

The cab, which will be spring supported on the truck frame, will be of sheet-iron and wood, and will have windows on all sides, in order that the occupants may have an unobstructed view in all directions. Within the cab will be set up the series parallel controller, by means of which the movements of the locomotive will be at the command of the driver, and the air pump, operated by a small electric motor, which will supply the air for the compressed air brakes and the whistle. The locomotive will be also equipped with bells, safety devices, etc., and will have a Janney automatic coupler at each end.

From the illustration of one truck it will be seen that the finished locomotive will be an imposing piece of electrical machinery. It will weigh in its completed state 95 tons, will be 14 feet 3 inches long, 9 feet 6¾ inches wide, and will be of standard gauge. The maximum speed will be 50 miles an hour. This will be reduced to 30 miles an hour when only half the draw bar pull is exerted, and to 15 miles an hour with full draw bar pull. The average speed of the loaded train will be about 30 miles an hour. It can, of course, be run either forward or backward.

This locomotive is designed for heavy work and will be called upon to handle trains as heavy as those now handled by the heaviest steam locomotives. A test of one of the completed trucks, as shown, representing one-half of the locomotive, was recently made upon the tracks at the Schenectady works of the construction company. In order to obtain the necessary load a New York Central heavy six wheel engine was made use of and the electric locomotive truck coupled to it. The machines were then sent in opposite directions and tugged at the connecting coupling as in a tug of war. The electric locomotive had a slight advantage over the steam engine in weight on the driving wheels, and pulled it up and down the track with apparent ease. For the same weight upon the drivers it was shown that the electric locomotive will start a greater load than the steam locomotive, the pull being constant throughout the entire revolution of the wheel, the difficulty of variation of pull with the angle crank as in the steam locomotive being eliminated. The test also proved that not only were the motors sufficiently powerful, but that the driving mechanism and armature couplings are amply strong to transmit the torque of the armature to the axle.

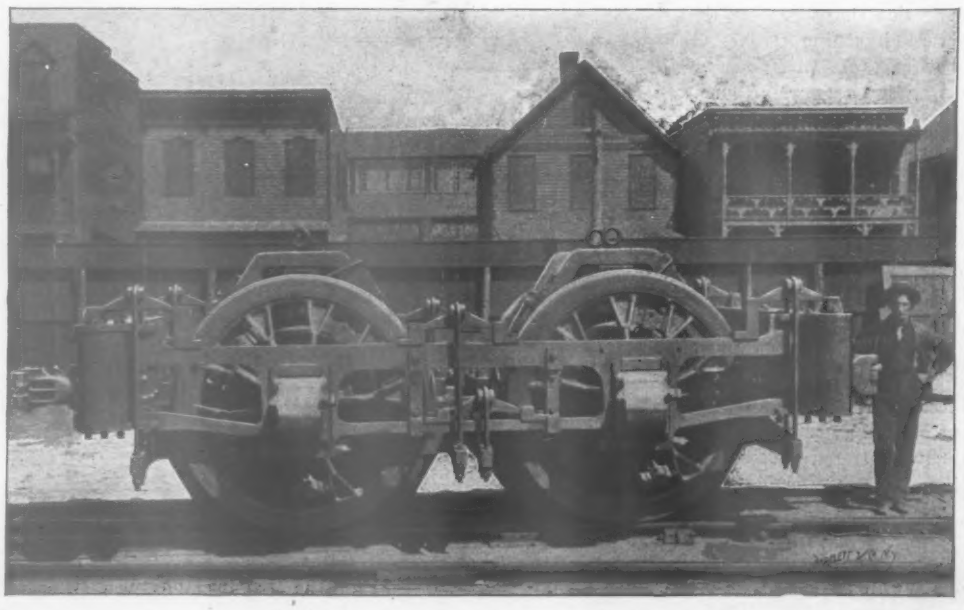


Fig. 2.—Side View of One of the Baltimore and Ohio Railroad's Electric Locomotives. The Largest Electric Railway Motor in the World.

ON THE PRODUCTION OF ROTARY MAGNETIC FIELDS BY A SINGLE ALTERNATING CURRENT.

READ BEFORE THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS DECEMBER 19, 1894, BY LUDWIG GUTMANN.

(*Concluded from page 313.*)

Returning once more to the earlier diagrams, Figs. 9 and 10, we see that below synchronism there are two other speeds that are entitled to be called synchronous, because a certain fixed relation exists between the periods of field excitation and armature rotation.

It will be evident that the greater the number of closed circuits, the greater is the number of harmonic or synchronous speeds in which the armature can operate. If the armature contains ten closed circuits, and rotates in a two-pole field, it will be able to generate five currents, lagging 72 degrees behind one another in phase, and would have at least five speeds which are synchronous, and the armature, owing to its peculiar construction, can operate at a slower speed than the synchronous speed as interpreted heretofore.

Looking at the device from a general standpoint, it will be clear that this particular armature construction embodies all the weak points of a synchronous and all the strong points of a polyphase motor. The weak points are:

1. That the machine will not start from state of rest in the form shown, because in Figs. 1, 2 and 12, the coils act on one another differentially and have a variable and negative value; they are in magnetic stability when at rest, hence no rotation can result.

2. The device has a small starting torque when rotated, owing to the differential action of the coils, which cause, with a small number of closed circuits, strongly oscillating or jumping poles until a harmonic speed is reached.

3. The device, when in rotation, is not reversible by simply changing circuit connections.

The strong points are:

1. That the motor develops polyphased currents in its own windings.

2. That, therefore, it is more difficult to pull it out of step, as it has the capacity to stand, what I would term, magnetic slippage.

Let us assume that a certain coil, which should reach a given point to run harmonically, remains behind owing to a slower motion of the armature; in this event the coil ahead has to perform the function at the expense of a heavier current. The loss of revolutions due to this action may be comparable to the slipping of a belt over a pulley. However, there is also a limit to the slipping. The armature should have some harmonic speed with respect to the alternations. Should it fall below the lowest harmonic speed, then it will come to a standstill just like any other overworked synchronous machine.

Synchronism in a motor means nothing more nor less than a magnetic flexible clutch, which may be represented mechanically as follows:

The old fashioned non-starting synchronous machine having equal armature coils and field poles, can be compared with the arrangement shown in Fig. 15*a*, giving side view and elevation. The disk 1 is provided with two projections; 2, imparts rotation to shaft 4 by means of the flexible arm, or spring 3, which enables the shaft 4 to be slightly behind or ahead of disk 1. However, if the work put on shaft 4 is in excess of the strength of spring 3, then it will break, and shaft 4 will speedily come to a standstill.

In contrast to this older form of synchronous motors stands the new one, which forms the subject of this paper and the machines operated by bi- or polyphased currents. The mechanism for showing magnetic coupling for these latter types may be represented by Fig. 15*b*. In this case, 1 represents a crown wheel the teeth marked 2; into these teeth meshes a catch 3 in a flexible manner, which catch is connected rigidly to shaft 4. Within the range of normal work, catch 3 would remain fixed between the two given teeth, but if the shaft 4 is overloaded, the flexibility of catch 3 will cause it to yield, and pull out of its position, drop in between some other two teeth, and continue to operate, but at a slower speed. The greater the excess of work the greater will be the slippage and the more

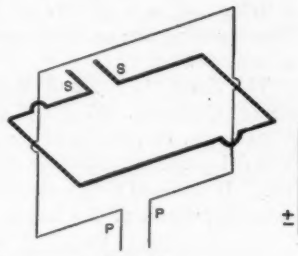


FIG. 16.

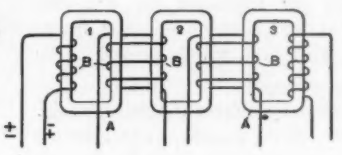


FIG. 17.

teeth will be jumped by the catch 3 in every revolution of disk 1. For the synchronous motor herein described, the overloading to the extent that it cannot reach the lowest harmonic speed would be equivalent to the breaking of spring 3[1].

It will be remembered that Prof. Ferraris obtained a rotary magnetic field and rotation by influencing one coil carrying a primary current, by another at right angles thereto carrying secondary currents. Here we have two phases from a single source, Fig. 16. To obtain a multiple of phases we may take two or three iron cores A and surround them with coils B, like the links of a chain, Fig. 17, so that the secondary coil of transformer 1 is the primary of transformer 3, and so on; or we may design a special core for a transformer, and create a rotary magnetic field by applying to one coil a primary current from the line, and to another coil a secondary current from a transformer, whereupon by the rotary field obtained, polyphased currents may be taken through other coils on the transformer. These methods have, however, one drawback, and that is that the phase will change more or less in lag with difference in load, while for many purposes it is most essential that for efficient working the phase should remain at the same constant angle. This desideratum has been accomplished by the device under consideration, and any suitable number of currents lagging in phase may be obtained from a single alternating current.

To obtain a rotary magnetic field in or by a stationary body, at least two electric or electro-magnetic forces of definite phase relations, acting at an angle to one another and changing at periods harmoniously, are essential requirements.

If, however, we allow the body, or part of the same, to be movable, we may substitute mechanical rotation primarily as an adjuster of the periodicity and phase of one of the two forces; the fundamental relation between the two forces must in this case also be the same as in the other; namely, they must work in harmony and the periodicity and phase determines the periodicity and phase of the other of one force. If the second force is a current, it must be one of the same period or some harmonic of that period; if it is rotation, it has also to be synchronous or harmonic.

We can now clearly understand why, when rotating the armature, Figs. 1 and 2, in an ordinary alternating current field, we have no system of polyphased currents and no rotary field, simply because the armature rotation does not stand in any relationship whatever to the alternations; but as soon as the speed does so, there are generated polyphased currents lagging in phase at a fixed angle, and a rotary magnetic field.

There is a difference whether the armature is influenced by a single alternating current, or by several, causing themselves a rotating energizing field. Nevertheless, in either condition the armature is in magnetic stability, and this state is the reason that it remains stationary in the first case and that it rotates in the second.

The reason that the motor starts in the second case is evidently because the inducing magnetic field is itself rotating in the stationary field magnet core. As said before, it is considered necessary for the proper operation of the armature for giving maximum torque, that if placed in an alternating current field of force the armature rotation should have a definite relation to the alternations. Up to the publication of this device, some three years ago, synchronous motors had as many armature coils as field coils, and hence to obtain the value of the synchronous speed, all that was necessary was to divide the alternations of the armature current n by the number of field poles p of the magnet employed. But if the number of armature coils are not the same as the field poles, then the speed may vary from this synchronous speed and

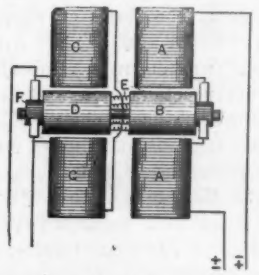


FIG. 18.

a modification is thought to be necessary. We would have to find the smallest common factor between the field poles p and armature coils p^1, with which we have to divide the number of alternations to obtain the value of the lowest synchronous speed, while the condition of slippage may allow for the lowest harmonic, the value $\frac{n}{p\,p^1}$.

It will now be clear that motors can be designed having any desired variation of speed and have defined synchronous speeds or approach the indifferent relation. I wish it understood that I do not intend to treat the subject in all its details, and I am especially reluctant on the ground of having carried on but few experiments.

The few diagrams presented do not disclose many conditions of those possible. They show only one or two facts of conditions which frequently are of a complex nature. Evidently the rotary magnetic fields in the device under consideration may have altogether different speeds from those shown in the diagrams; also, that the magnetic field may rotate with and ahead of the armature, and lastly, the speed of rotation of the rotary field of the armature may be synchronous, and opposite in direction to its rotation.

The device has been given in the form of a diagram, and as it has been described as not self-starting, I wish now to state that it becomes self-starting as a series, a shunt or an induction motor in a field of single phase or polyphased alternating currents. Fig. 18 represents one of the earliest forms, which have since been simplified to a considerable extent. The part A B represents here a simple series motor whose armature B may be any drum or ring type, open or closed coil winding; the part C D may be similarly constructed. Both armature windings B and D are connected electrically by four wires E at points of equal distance, which number of conductors E may be reduced or increased, depending on the number of phase currents desired. Now send an alternating current into the series motor, part A B*, then the armature will start from state of rest and will send current impulses into the D part winding, which becomes the more regular the more the armature has approached synchronous speed, where biphase currents will be established therein; these react on the field magnet core C, and for the purpose of maintaining the armature in this synchronous speed, the commutator F is applied to rectify the polyphase currents, which continuous current may be used to energize the magnet C.

The fundamental principle disclosed opens to us a very wide field for work. Not only are we enabled to construct motors almost as cheap and simple as continuous current motors, but there is in this principle involved the germ for the ideal distribution of power, inasmuch as we are enabled to collect the polyphased currents generated, or commutate them immediately at will.

Finally, I wish to call your attention to the fact that the last figure is in reality a motor-generator, and it is, therefore, evident that the electrical energy supplied need not all be transformed into mechanical power, but that a portion may be utilized in one of the modified forms named above.

The Greeley Fire.

The fire in the large electrical supply store of the E. S. Greeley & Company, 5 and 7 Dey street, New York, which occurred on December 23 and which was reported in last week's ELECTRICAL REVIEW, has occasioned no inconvenience to the firm in filling orders. The damage to the property of the corporation is confined entirely to the stock, fixtures and building, all the books and papers being miraculously left unharmed intact, in no wise impairing the working effectiveness or records of the business, which went on a few hours after the fire had occurred as freely and uninterrupted as if the disaster had never been, the corporation drawing upon its large reserve stock from adjacent warehouses to fill orders without delay. No removal from the burnt premises is contemplated. The loss in stock, fixtures and machinery will probably not exceed $25,000 to $30,000, and that on the building about $5,000, all of which is amply covered by insurance to four times the amount involved.

*Preferably so that no reaction takes place from part D.

ELECTRIC RAILWAY NOTES.

The electric railway on Kearney street, San Francisco, is in regular operation.

Electric cars will be running on Bay street, Jacksonville, Fla., soon after January 1.

A franchise for an electric street railway at Hot Springs, Dakota, was granted by the City Council to Pennsylvania capitalists. It is to be completed and in running order by July 1, 1895.

The Yonkers, N. Y., Electric Railroad Company is making preparations to introduce a system of automatic block signals on its Mount Vernon line so as to prevent collisions on the sharp curves, of which there are several on that line.

A trolley car mail route between the Brooklyn, N. Y., Post Office and Flatbush and Flatlands, L. I., has been arranged and will go into effect on January 3. The route is over the Brooklyn City Railroad Company's Flatbush avenue line.

The Cataract Electric Company is to have a trolley system constructed from Niagara Falls to Tonawanda, N. Y., early in the Spring, and inventors of the different methods of propulsion by electricity will be invited to test their schemes.

The Poughkeepsie City and Wappinger's Falls, N. Y., Electric Railway has been opened for business. The opening of the electric railway was celebrated on December 15 by a banquet tendered to Major J. W. Hinkley, projector, builder and president of the road.

The council at Saginaw, Mich., has established by ordinance the following rates of street railway fare: Five cents for single fare; workingmen's tickets and school tickets, eight for 25 cents; regular tickets, six for a quarter. Workingmen's tickets will be good only from 5.30 to 7.30 A. M. and 5.30 to 6.30 P. M.

After a prolonged contest between the Trumbull company, of Warren, Ohio, a Niles company, and the Mahoning Valley company, the latter has been granted the franchise for an electric railway from Niles to Youngstown, Ohio, by the commissioners of the county. The line must be in operation by September, 1895.

The Railroad Committee of the Brooklyn, N. Y., Board of Aldermen has prepared an ordinance with a view to a more strict regulation of the steam traffic on Atlantic avenue by the Long Island Railroad Company. One of the provisions is that all trains must come to a full stop at trolley crossings under penalty of $100 fine.

The Adrian, Mich., Street Railway has gone into the hands of a receiver, and Frank C. Snow, of Detroit, is named as such. The cars have not been running for some time, and suit is pending to forfeit the franchise. The petition is in behalf of the bondholders for $50,000 of bonds, on which interest has not been kept paid.

After a great many postponements the Attleboro, North Attleboro and Wrentham, Mass., Street Railroad has been sold to E. R. Price, as trustee for a syndicate, for $51,000. Among those who compose the syndicate are C. L. Watson, H. F. Barrows, Lyman B. Goff, and Marsden J. Perry. It is stated that the road will be put in first-class running order as soon as possible, equipped with modern cars and a new power station built.

Henry Bier, a prominent broker of New Orleans, is indicted for perjury. The charge grows out of the purchase of the principal street railway franchises of the city by the New Orleans Traction Company. Citizens instituted proceedings to have it set aside. On the trial Bier swore that he had bought the franchise for his own account and that no one was interested with him, which proved to be false.

Since the purchase at receiver's sale, by the Fort Worth, Texas, Street Railway Company, of the North Side Street Railway, both lines have been consolidated under one management under the former name. Under the new management the officers elected are: President, K. M. Van Zandt; vice-president, Morgan Jones; secretary, J. Peter Smith; superintendent, Geo. B. Hendricks. It is announced that the entire line will be thoroughly rebuilt; new ties will be put in, and the present 30 pound steel rails will be supplanted by 52 pound rails. Fifteen new cars have also been ordered.

LITERARY.

Scribner's Magazine for January begins the XVII volume and gives a foretaste of a number of the important projects which are to characterize the year. Among the most attractive of these is the series of papers by Robert Grant on "The Art of Living," written in a semi-satirical but very practical vein, and dealing with the every-day problems of living in the humorous and shrewd manner that made his "Reflections of a Married Man" one of the most popular series ever published in this magazine. In this number Mr. Grant begins with a discussion of the question of "Income," showing what the average man can do with $2,200 a year and with $10,000.

"Proceedings of the International Electrical Congress Held in the City of Chicago, August 21 to 25, 1893." Cloth, 488 pages, illustrated. Published by the American Institute of Electrical Engineers. Price, $3.00. Supplied by ELECTRICAL REVIEW.

The complex proceedings of the Congress are here recorded in readable form. A history of the formation of the Congress is also given, as well as the numerous addresses read before it. The publication committee having in charge the production of this volume is to be congratulated on its work, which was naturally of such a character that delay in publication was unavoidable. An excellent halftone engraving showing the official delegates to the Congress forms the frontispiece.

CALENDARS AND HOLIDAY GREETINGS.

THE "ELECTRICAL REVIEW" ACKNOWLEDGES RECEIPT OF CHRISTMAS REMEMBRANCES.

The *Commercial Advertiser*, New York's oldest newspaper, is sending out one of the newest forms of memorandum pad calendars.

The Cincinnati Screw and Tap Company, Cincinnati, Ohio, have prepared a novel alphabetical announcement advertising their wares.

The Link Belt Machinery Company, Chicago, presents a handsomely lithographed calendar with a suitable and apt picture of Father Time turning the world by means of a link belt.

The Solar Carbon and Manufacturing Company, 95 Fifth avenue, Pittsburgh, Pa., has issued a morocco-covered perpetual calendar for desk use. It is one of the handsomest and most serviceable of the season.

The American Electrical Works, of Providence, R. I., who are noted for their novel advertising devices, maintain their record and have evolved a New Year's card which presents a portrait in colors of their most valued friend.

J. Jones & Son, 67 Cortlandt street, New York, dealers in electrical supplies, sent each of their friends a Christmas turkey in a brown paper bag with the admonition, "Don't miss the stuffing." Send for a turkey—it's great.

Alfred F. Moore, 200 and 202 North Third street, Philadelphia, the well-known wire manufacturer, has produced a calendar that is especially valuable to his near-sighted friends. The figures are large enough to be seen with ease. A picture of the new City Hall at Philadelphia occupies the center of the card.

To Avert a Street Railway Strike in Brooklyn.

Conferences were held last week between officials of the Brooklyn City, N. Y., Railway Company and delegates from the Knights of Labor to discuss the wages question for 1895. The men ask $2.25 a day for motormen and conductors, an increase of 25 cents over the rate paid in 1894. They also demand a decrease in the number of "trippers" and a corresponding increase in the number of full-day cars, stipulating that three-fourths of all the cars on all the lines shall be run on a full-day schedule. In the last clause of the men's petition there is a demand that the number of apprentices in the electrical department should not exceed 20. All the surface street railroad men of Brooklyn and Long Island City have united in the demands submitted to the Brooklyn City road.

There is a new movement on foot to build an electric railroad 15 miles from Portland, Me., along the Cape Elizabeth shore. Several capitalists will petition the next legislature for a charter.

PERSONAL.

Commander C. F. Goodrich, United States Navy, is returning from China and will have his headquarters in New York. The Commodore is an enthusiastic electrician and has many friends in this scientific field.

Mr. John MacCormack, who recently severed his relations with the Stirling company, has established himself as a consulting engineer at 126 Liberty street, New York city. He will make a specialty of expert mechanical work.

Mr. W. F. Banfiel, late vice-president of the National Automatic Fire Alarm Company, of Baltimore, and Washington, D. C., is now in the employ of the Indiana Telephone and Construction Company as general manager. This company is introducing the Strowger automatic telephone exchange system in that State.

Mr. C. E. Sargent, of Chicago, has become the Chicago representative of the Ball & Wood Company, the well-known engine builders of New York city. Mr. Sargent's offices for the present, at least, will be in the Home Insurance building, where all visitors will be welcome. Mr. Sargent has long been identified with engine interests in the West, and will doubtless succeed in convincing his friends and the trade that the Ball & Wood engine can do as good work in the West as it is doing in the East.

Mr. Hess Didn't Get His $50,000 Commission.

Edward B. Hess' $50,000 suit against the Thomson-Houston Electric Company, to recover for services rendered, was on trial in New York city on December 21 before Justice Williams. Hess alleges that the defendant agreed to pay him five per cent of the purchase price of all electrical appliances bought by surface roads above the Harlem. The Huckleberry road, he alleges, adopted the Thomson-Houston system through his efforts, and also laid in $1,000,000 worth of supplies bought from the same concern. The defense is that the purchases were not due to Hess. After Hess' testimony was given, Justice Williams dismissed the case, saying that the plaintiff's evidence did not justify sending the case to the jury. Mr. Hess says he will bring a new action.

Westinghouse Company Reported to be Figuring on Manhattan Railway Equipment.

It was rumored in Pittsburgh on December 26 that the Westinghouse Electric and Manufacturing Company is about to contract with the Manhattan Elevated Railway Company to furnish an electrical equipment for the entire elevated railway system of the metropolis. It was said that experts are now in New York figuring on the cost of such a system, and that the terms on which the work can be done will be given to the elevated company very shortly.

General Manager F. K. Hain, of the Manhattan Railway Company, denied the rumor.

Engineer Parsons' $66,000,000 Rapid Transit Plan For New York City.

At a meeting of the New York City Rapid Transit Commission held last Wednesday, Chief Engineer Parsons submitted a report which summarized the chief engineering difficulties which the commission and its engineers have recognized as having to be met in laying out and constructing a rapid transit underground route, and in it Mr. Parsons suggested a way of overcoming some of them. After commenting on several projected routes Mr. Parsons' report went on to say:

"If, however, you do not accept these suggestions, and decide to adhere to the Broadway route with four tracks, I submit for your consideration the following plans, which have been designed to lessen the objections stated.

"The principle of the design is the treatment of the local tracks and the express tracks as separate railroads and the construction of each double track independent of the other, so as to obtain the maximum of efficiency for both.

"The former would naturally follow the undulations of the street as closely as possible in order to have a minimum depth at the station platforms, while the express line should have shallow stations at long distances, and between these stations be run on more favorable gradients. The express stations will be located probably at City Hall and Fourteenth street. At City Hall the platforms can be kept near the surface, and at Fourteenth street all tracks can be brought to the same level, or a double-deck station can be constructed, as may be preferred. The double-deck station presents the advantage of a separation of the tracks at the Fourteenth street junction, and also of a possible continuation of the method of the proposed construction as far as Thirty-fourth street, so as to pass the narrow portions of Broadway at Eighteenth street and Twenty-eighth street without the difficulty attending the construction of four tracks on a level. By this method there will be less interference with the vaults or private property, and, as the excavation will be at a greater distance from the house lines, there will be less necessity for underpinning.

"By the plans submitted the railway would be constructed by taking one-half of the street at a time, laying the side walls in a trench and then turning half the arch. The other half of the tunnel would be completed later. All the material beneath this arch could be excavated after the latter was completed and the street surface restored. The lower tunnel could be constructed by means of circular shields, and as these would be driven beneath the masonry tunnel previously constructed, there would be little danger of a movement of the ground sufficient to affect the street surface. The running of the cable railway would not be interrupted.

"The material used in the construction would be of the most durable nature, as the upper tunnel would be constructed entirely of masonry, and would not be corroded, as iron would be, by the gases and acids and other substances with which the soil next to the surface is saturated.

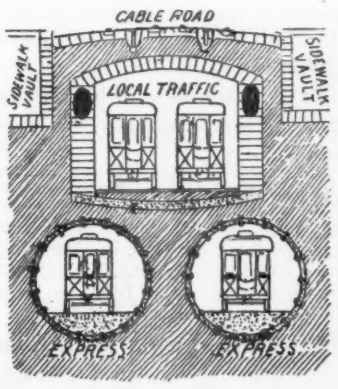
"This plan also presents the advantage of the city being able, in conjunction with this work or subsequently, to build pipe galleries on the haunches of the arch.

"The making of an estimate in advance of detailed plans is always a difficult matter, but especially so in this case, on account of the complicated character of the work. Where buildings will have to be underpinned, and property rights invaded, it is almost impossible to make reliable figures. How far property rights go with the vaults, and whether the owners can or will make any claim for compensation for their loss, or to what extent claims for other damages will be made, must be left for others to decide. To the item for the construction of the provisionally adopted plans there must be added these additional amounts.

"Having advised you that it is not reasonably practicable to build a four-track railway without disturbing the surface of the street, I make no estimate for the work done in that manner.

"In the estimates herewith presented I have added a large amount for contingencies, which is intended to cover such as may arise during construction, but nothing has been allowed for property rights or damage to abutting property."

The total cost of Mr. Parsons' suggested road, exclusive of any allowances for private property, property rights or damages to abutting property, is between $65,000,000 and $66,000,000. The commission is authorized to spend but $50,000,000, and consequently the cost of building the road must fall within that amount. Commissioner Low offered the following resolution, which was adopted:



SECTION THROUGH ENGINEER PARSONS' PROPOSED RAPID TRANSIT ROAD.

"*Resolved*, That the report of the chief engineer be submitted to a body of experts, five in number, with a request that they report at the earliest practicable day on these points:

"First. Whether the calculations as to probable cost embodied in this report may be properly accepted by this Commission as a basis for its conclusions.

"Second. Whether they concur in believing the plan of construction in Broadway proposed by the former Commission unsatisfactory for the reasons suggested by the chief engineer or for any other reasons.

"Third. Whether the plans submitted by the chief engineer of treating the local and express tracks as two roads, using the same stations when they join, appears to them practicable and wise.

"Fourth. Whether they can suggest any better solution of the problem before the Commission than has already been brought forward.

"This last question is intended to open the way for the freest possible suggestions, so that no one can say hereafter that the engineers were asked only to act upon specific questions submitted to them, but were not asked to propose of their own motion such a solution as might seem to them wise."

A Big Electric Railway Scheme in Ohio.

The articles of incorporation of the Cincinnati, Hamilton, Middletown and Dayton Street Railroad Company were filed at Columbus, Ohio, on December 21. The company has a capital stock of $500,000, which will be increased as the work on the road progresses. It is announced that this will be as fast as the weather will permit.

As the name indicates, the company's object is to construct an electric street railroad between Cincinnati and Dayton, running through the following localities: Cincinnati, Avondale, Carthage, Wyoming, Glendale, Hamilton, Middletown, Franklin, Miamisburg, West Carrollton and Dayton.

The incorporators are Gen. Andrew Hickenlooper, president of the Cincinnati Gas Company; Charles Fleischman, president of the Fleischman Distilleries and Yeast Company; L. C. Weir, president of the Adams Express Company; H. H. Hoffman, a well-known tobacco merchant and capitalist, of Cincinnati; Henry B. Morehead, capitalist; O. C. Barber, president of the Barber Match Company; and O. B. Brown, representing the Dayton interests in the Dayton Traction Company. There are other capitalists, whose names do not appear in the articles of incorporation, who will appear in the management. This consolidates all interests composed of the Cincinnati & Dayton Electric Railroad Company, the Cincinnati, Middletown & Dayton Traction Company, and the Dayton Traction Company, and makes it a certainty that the road will be constructed and in operation as quickly as possible.

Officers of the Northern Society of Electrical Engineers.

The following is a list of the officers and council for 1895 of the Northern (British) Society of Electrical Engineers: President, Henry Edmunds; past president, Dr. John Hopkinson, F. R. S.; vice-presidents, G. E. Preece, W. P. James Fawcus; honorable solicitor, John B. Parkinson; honorable treasurer, George J. Somerville; honorable secretary, John Darney; members of council, A. B. Blackburn, Thomas Browett, E. A. Claremont, S. V. Clirehugh, G. S. Corlett, E. W. Cowan, C. M. Dorman, G. W. Lowcock, E. Manville, J. H. Rider, James Taylor, C. H. Wordingham.

Suits on Wenstrom Patents.

News comes from Baltimore that Mr. R. T. McDonald, president of the Wenstrom Electric Company, has been in Baltimore consulting with his attorneys and preparing data on which to bring suit against the Westinghouse and other electric companies for alleged infringement of some of the Wenstrom patents. He denied the recent rumor that the Wenstrom works are to be closed, and said the capacity of the Wenstrom plant is not to be abridged in any way.

A Magnetic Girl Trick Exposed.

While in Chicago I saw the announcement of an electric girl who included in her repetoire a new trick, or, at least, one that I had not yet seen, says Nelson W. Perry, in *Cassier's Magazine*. A stick, about four feet long and as thick as a broomstick, was produced and I and another gentleman were requested to hold it in a vertical position before us while grasping it firmly in both hands. The girl, standing in front of us and facing us, placed the palm of her open hand against the lower portion of the stick, resting it on the side nearest to us and furthest from herself. After rubbing her hand up and down for a few moments, in order "to make better electric contact," as we were informed, and, after enjoining us to hold the stick perfectly vertical, we were told to press down on it as hard as we could. This we did until the veins seemed to stand out on our foreheads; but, exert ourselves as hard as we could, we, two strong men, were unable to press down hard enough to make the stick slip past the open palm of her hand. Had the girl grasped the stick with her two hands, I am sure she could not have withstood my downward pressure alone. I would have borne her, stick and all, to the floor. But there she stood, with but one open hand bearing against the side of the stick, and both of us could not, by our united efforts, force the stick past that wonderful hand. Surely there seemed something uncanny about this. But it is very simply explained.

The whole secret consists in insisting upon the men holding the stick in a vertical position. When the girl's open hand is first placed against the lower portion of the stick, she moves it two or three times up and down, pulling gradually more and more against it. As this tends to pull the stick away from the vertical, she insists that the men keep it straight. Thus cautioned, they will exert more and more effort until, when she feels that the pressure against her hand is sufficient, she instructs them to push down with all their might. They do so, and imagine that they are exerting a tremendous vertical thrust, whereas their vertical effort is actually very slight—insufficient even to overcome the friction of the stick against her moist hand. The men are really exerting a tremendous effort, but are deceived as to its direction. With their hands tightly grasping the upper end of the stick, they are really trying to force the other end of the stick against the palm of her hand.

OBITUARY.

The wife of Frank C. Perkins, an electrical engineer of Buffalo, N. Y., died at Dunkirk, N. Y., on December 24.

Mr. Charles E. Adams has resigned the presidency of the Bradbury-Stone Storage Battery Company, of Lowell, Mass.

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Please preserve the volume index issued with this number of the ELECTRICAL REVIEW. We receive many requests for additional copies from subscribers who lose the index and cannot, therefore, satisfactorily bind the REVIEW. Hence this caution.

ABOUT TELEPHONE PATENTS.

There is no abatement of interest in the telephone situation; our mail is crowded with inquiries. Many of them have heretofore been answered in the ELECTRICAL REVIEW. In this journal of April 4, 1894, the carbon telephone patents were exhaustively reviewed editorially. From the fact that Judge Carpenter's recent decision agreed with the opinion we expressed at that time, it is fair to presume that the learned judge knows where to look for accurate information. The ELECTRICAL REVIEW of April 4, 1894, said:

Now, inasmuch as Berliner patented a telephone November 2, 1880, No. 233,969, showing and describing exactly the same apparatus as is shown and described in the above quoted patent [the Berliner patent of 1891], but in which a claim both for the apparatus as a receiver and for the system of transmission were claimed, it would seem that the *later patent would be void.*

Judge Carpenter, in his decision handed down December 18, 1894, said:

The first ground of the bill to which I shall refer is that the patent is void, as being beyond the power of the commissioner to issue, in view of the issue of a former patent, No. 233,969, issued November 2, 1880, to Emile Berliner, for electric telephone.

In the same issue of the ELECTRICAL REVIEW appeared the following editorial article which, judging from our present inquiries, it is timely to republish, describing as it does the Edison patent of 1892:

Patent No. 474,231, granted to Thomas A. Edison, May 3, 1892, contains the following claim:

"In a telegraphic apparatus operated by sound, the combination, with the diaphragm, of one or more contact points of plumbago or similar inferior conductor in the electric circuit, whereby the rise and fall of electric tension is proportionate to the pressure exerted upon the said points by the diaphragm substantially as set forth"

The invention contained in this patent was patented in a number of foreign countries, England, Canada, France, Belgium, Austria, Hungary, Italy, Germany, Spain and Russia. Under Revised Statute 4887, "every patent granted for an invention which has been previously patented in a foreign country is limited to expire at the same time with the foreign patent, or if there be more than one at the same time, with the one having the shorter term."

The term of the British patent is 14 years. The British patent, therefore, expired July 30, 1891. It will be maintained, however, in the interest of the Edison patent and of the Berliner patent, hereinafter more fully noted, that the ordinary construction of the above quoted statute is not a proper construction, and that the words "previously patented" in the statute mean not previously to the date of the United States patent, but previously to the date of the United States application, and the application was filed in the United States Patent Office, July 20, 1877. This matter, as to the meaning, is pending in the Supreme Court of the United States, and is expected to be heard in the Fall. [Bate refrigerator case.] It has been said that the American Bell Telephone Company and the General Electric Company, both of which have great interests at stake in the decision, are, in reality, defending the case. What the decision will be cannot, of course, be prophesied. The almost universal construction heretofore put upon the language of the statute is that the term "previously patented" means that the date of the foreign patent is prior to the date of the United States patent. Under this construction the Edison patents would be void, having in reality expired before they were granted. Those who are contemplating using carbon telephones, however, should bear in mind that the question is not definitely settled, and will not be until the Supreme Court renders its decision. It will be noted, however, in looking at the Edison claim, that it covers only two electrodes which contain one or more contacts of inferior conducting material, upon which the pressure is varied by the motion of a diaphragm. Now there is a clean-cut class of carbon transmitters that would not seem to fall within the scope of this language; namely, a modification of Hunnings, wherein carbon granules may be placed loosely in a receptacle which is vibrated by the action of the diaphragm and the resistance of which varies during the motion of the diaphragm merely by the shaking up of the particles. A transmitter of this type has been recently patented by an enterprising inventor outside of the Bell fold.

GIVE MAYOR STRONG ELECTRIC LIGHTS!

In the early days, when New York city was but a large village and the Mayor was a magistrate, the custom was established of placing two lights in front of the Mayor's residence. These lights were installed and kept lighted at the city's expense, the idea being that the Mayor's residence should be so marked that anyone could find him during the night. The custom has been followed down to the present time. The Board of Aldermen two years ago recognized the lamp custom by adopting an ordinance providing for the erection and maintenance of two gas lamps in front of Mayors' residences.

Now it has been discovered that owing to the peculiar design of the steps on Mayor William L. Strong's house in Fifty-seventh street, it will be a very difficult matter to put two gas lamps there. That's good. It is time that the gas lamps gave way to electric lights, just as the oil lamps were supplanted by gas. Mayor Strong's residence should be provided with a handsome wrought-iron fixture containing four or five high candle-power incandescent electric lamps. If the current isn't handy, it should be brought to the house at the city's expense.

The custom of marking the Mayor's house with lights is a good one and should be maintained, but in these progressive days gas won't do. Mayor Strong was once president of the Brush-Swan Electric Light Company and, we believe, would much prefer the electric light.

Wall Street and the Electrical Stock Market.

The year which has just closed chronicled innumerable effects of the great panic. The congestion of business reached its height in the early months, necessitating a wholesale reduction in wages—in many instances the closing down of manufacturing plants and rigid economies in railroad operation. This contraction naturally paved the way for labor strikes, which were hard and bitter, in many instances accompanied by lawlessness, and in nearly every case terminated in favor of the employer. It was the inevitable result, as the supply of labor exceeded the demand. Wages are from 25 to 35 per cent lower than two years ago, offsetting which there has been a corresponding reduction in the price of staples, which goes far towards maintaining the purchasing power of the daily wage. The long drawn tariff agitation terminated about the first of September, and furnished business a basis on which to resume operations. This was the starting point, and since that time there has been a general movement toward a resumption of industrial activity.

The one great barrier which stands in the way is the lack of confidence. It is plainly reflected by the hoards of idle money in the banks and the low rates current for loans. Confidence is about 81 per cent of the circulating medium of the country. Until it is fully restored business must necessarily be hampered. The barrier which stands in the way is the condition of the United States Treasury. The attempt to keep its many millions of greenbacks and silver on a par with gold through the medium of a gold reserve which is considerably less than $100,000,000, and which is becoming smaller daily, is growing more feeble month by month, and is justly creating apprehension. The plan proposed by the bankers to retire the greenbacks is calculated to strengthen the Treasury. There is some chance of its being enacted, in substantially its present form, within six months or a year.

One of the weakest spots in our economic structure at present is the railroad situation. There have been enormous losses in earnings, and economies in operation carried beyond the safety point, which are already resulting in permanent detriment to the properties. There can be no successful reorganization of insolvent properties until the revenues are increased. On the other hand there can be no increase in revenues until freight rates are higher and more stable. The railroad pooling bill now before Congress with a fair chance of enactment, is calculated to furnish the instrument which will enable railroad companies to get on their feet. A most startling fact, and one not generally known, is that could the roads receive one mill per ton per mile more on their freight it would add $90,000,000 to the earnings of the roads, while no shipper would feel the increase as it would be almost imperceptible. This increase would be about equivalent to the dividends paid by the roads in the United States in 1893, the exact amount being $93,537,681. The pooling bill is not only in the interests of the railroads but also the industries of enormous magnitude dependent upon them. It would also benefit indirectly every shipper of goods who would thereby be ensured a fixed rate. He would feel sure in purchasing supplies that he would not incur the chance of being caught on a reduction in freights with a large stock of goods on hand.

The 1895 crop will play a most important part in the industries of the country, as it will determine the volume of traffic for the railroads and the purchasing power of the farmers of the great West, now about exhausted. A new currency system, a pooling law which will ensure fair freight rates, and exterminate a horde of cut-throat agents who charge fabulous commissions, and a good crop, would put this country upon its feet before the close of next year.

The remarkable ease with which the electrical and street railway companies passed through the panic, and the following year of liquidation, has attracted the attention of capital, and they are promised a better demand hereafter than they have ever experienced. They are more completely removed from depressing causes which spread with epidemic-like rapidity at times over the country, for the reason that they are located in centers of population, and their operation is necessary in the daily economy of the inhabitants. Inclement weather and the failure of crops do not affect them, while their systems are sufficiently intact to enable stockholders to have direct supervision and to prevent the incurring of needless obligations which so often in the case of steam roads has resulted in cumbersome debts and the inevitable receivership.

In the electrical stock market during the closing week of the year there was very little of importance to note. General Electric was somewhat active, and the price was depressed of about 2 per cent on stories of a pending newspaper attack. The fact that it was heralded through Wall street and has not yet materialized, indicates conclusively that it was intended for stock market purposes. The tactics of the bears against this stock are so well known that their rumors in latter days create only languid interest.

Bell Telephone continues to show the effect of the decision in the Berliner case. Its quotations during the week on the Boston exchange were 191 early in the week, and later 193. The price before the decision was 200. The general market was apathetic in character, and completely professional. The dominating disposition seemed to be to wait until after the first of the year.

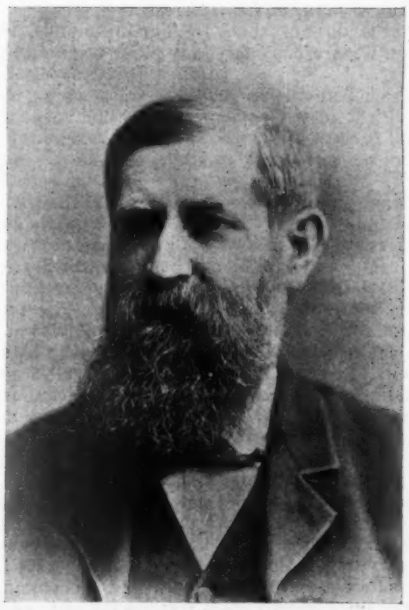
The Eastern Electric Cable Company, of Boston, has declared a regular semi-annual preferred dividend of 3 per cent, payable January 2 to stockholders of record December 31. Books close December 31 and open January 3.

BAIN.

New York, December 29.

Death of W. W. Smith.

Mr. W. W. Smith, secretary of the Missouri & Kansas Telephone Company, died at Kansas City, Mo., Friday, December 28, from a complication of disorders. Mr. Smith was born in Indiana in 1837, and was widely known as an old-time telegrapher and telephonist. He began life as a messenger boy in a telegraph office in Louisville, Ky., in 1853, and from this gradually rose through the various positions of battery man, telegraph operator, chief operator, manager and superintendent. From being superintendent of telegraph of the Indianapolis, Cincinnati & Lafayette Railroad, he became vice-president of the road which position he held for two years. Then with headquarters at Indianapolis, Mr. Smith acted as representative of the Western Union Telegraph Company and as superintendent of the Central Union Telephone Company. In 1884 he accepted a position with the Missouri & Kansas Telephone Company, where he remained until the time of his death.



WILLIAM WILEY SMITH, DIED AT KANSAS CITY, MO., DECEMBER 28, 1894.

Mr. Smith was an able electrician in his field and had kindly qualities of nature that endeared him to his many friends. He was one of the pioneers in both telegraph and telephone circles and his death will be sincerely regretted by electrical acquaintances in probably every State in the Union.

That Allegheny City Light Plant.

Mayor Kennedy, of Allegheny City, Pa., has vetoed the resolution of the City Councils by which the contract for a municipal electric light plant was given to the Westinghouse Electric and Manufacturing Company, who were not the lowest bidders. There were two bids lower, one of which was submitted by the Western Electric Company. Mayor Kennedy argued that to shut out foreign competition would hurt the business standing of the city and keep away foreign bidders. In view of the large contracts that Allegheny would have to give out in the near future he believed such a precedent would be disastrous. The Councils sustained the mayor's veto by a vote of eight to five.

CONTEMPTIBLE BUSINESS METHODS.

An impertinent, many-paged letter, signed by W. J. Johnston, proprietor of the *Electrical World*, is being sent to advertisers in other journals in this field advising them to discontinue. A modest request is made that they concentrate all their advertising in the *Electrical World* and consult with the said Johnston as sole oracle of advertising.

Such selfish ideas never disturb the ELECTRICAL REVIEW or its patrons. They generally react on the one who sends them forth. Should these un-American methods—these destroy-your-neighbor schemes — gain any footing in this country, we hope to be here to chronicle the fact and name all the factors.

When technical journalism is made the vehicle for the spreading of such contemptible and purely mercenary ideas, the ELECTRICAL REVIEW will most assuredly expose and properly characterize them.

MOONLIGHT SCHEDULE FOR ARC LIGHTING.

Expressly Prepared for the "Electrical Review," by the Eminent Astronomer, Prof. C. A. Young, of Princeton.

COMPUTED FOR TWO LATITUDES — CENTRAL TIME — WARRANTED WITHIN FIVE MINUTES ON PACIFIC COAST AND FOUR ON THE COAST OF MAINE.

The following table gives the time when the moon reaches an elevation of five degrees either rising or setting, computed for latitude 41 degrees (Chicago) and 33 degrees (Atlanta).

The dynamo may be shut off at this time when the moon is rising and must be started at this time when it is setting. January 4, 1.45 A. M. means 1.45 A. M. of the night January 4–5, *i. e.*, January 4 is counted astronomically as beginning at noon of January 4 and running till noon of January 5:

	JANUARY, 1895.	41 Degrees.	33 Degrees.
1.	Light.....	9.43 P.M.	9.56 P.M.
2.	"	10.43 P.M.	10.51 P.M.
3.	"	11.45 P.M.	11.47 P.M.
4.	"	12.49 A.M.	1.45 A.M.
5.	"	1.57 A.M.	1.47 A.M.
6.	"	3.09 A.M.	2.53 A.M.
7.	"	4.20 A.M.	4.00 A.M.
8.	"	5.34 A.M.	5.09 A.M.
9.	"	6.40 A.M.	6.17 A.M.
10.	Need not light up at all. midnight.		Moon full about
11.	Extinguish	6.00 P.M.	6.17 P.M.
12.	"	7.20 P.M.	7.29 P.M.
13.	"	8.45 P.M.	8.52 P.M.
14.	"	9.55 P.M.	9.50 P.M.
15.	"	11.06 P.M.	10.56 P.M.
16.	"	12.19 A.M.	12.02 A.M.
17.	"	1.29 A.M.	1.10 A.M.
18.	"	2.41 A.M.	2.19 A.M.
19.	"	3.52 A.M.	3.13 A.M.
	New moon on 25th.		
30.	Light.....	9.30 P.M.	9.27 P.M.
31.	"	10.40 P.M.	10.38 P.M.

The City Council has entered into a three years' contract with the Winona General Electric Company to light the city of Winona, Minn., with electricity at the rate of $87.50 per arc light per annum.

ON THE COMMERCIAL POSSIBILITIES OF ACCUMULATORS FOR TRAM-CAR TRACTION CONSIDERED AS A MUNICIPAL UNDERTAKING.

READ BEFORE THE NORTHERN SOCIETY OF ELECTRICAL ENGINEERS, BY ALFRED H. GIBBINGS.

INTRODUCTORY REMARKS.

During the past 12 months I have had occasion to consider the question of electric traction in each of the many forms in which it is placed before the public in general and municipalities in particular by the interested advocates of the respective systems. The fact is, the Corporation of Hull had it in contemplation to apply for an act of Parliament empowering them to acquire and work the tramway system of their own borough. I was, therefore, requested by my committee to place before them a report as to what had already been done in this country in the direction of electric traction, so that at least as far as this form of traction was concerned they would be in a position to consider each of the different methods on its own merits.

In my final report to the committee I submitted that, in my judgment, accumulators would offer greater advantages to the town than either of the other forms. The technical journals, however, in which this recommendation was published, did not, I am sorry to say, include the whole of my report to the Corporation. The consequence was (as might, indeed, have been anticipated) that several criticisms were passed questioning the commercial and financial results of the method I recommended, whereas, in fact, these results were the determining factors in the conclusion to which I ultimately arrived.

When the subject of electric traction is seriously approached by electrical engineers, corporations and companies, the usual course of procedure and investigation is to consider the relative intrinsic merits of the different systems apart from the very important question of the conditions under which the method is to be employed. Each of the three forms of electric traction, namely, the underground channel or conduit system, overhead wires or trolley system, and accumulators, has its own very able exponents in the technical press and elsewhere, but unfortunately the majority of the writers are themselves interested in the system which they advocate, and for this reason such papers cannot be considered to have the same value as if the authors had been entirely disinterested experts.

I am safe, perhaps, in admitting that the overhead wire or trolley system has proved a greater practical and financial success than either of the others. This statement, however, refers to cases in which a special plant has been put down to generate energy for the specific purpose of working whichever system has been adopted, and as far as my knowledge extends every comparison between the three systems in regard to cost and working efficiency has been made under these special circumstances. I am, however, digressing a little and will now resume.

The recommendation to adopt accumulators which I ultimately submitted to the Corporation of Hull was based upon an entirely new departure, in the working out of which I have been very interested. My object in bringing the subject before your notice in this paper is that my reasons and conclusions may be fully discussed, in the hope that a new light may be thrown upon municipal undertakings. I have come to the conclusion that the secret of success lies not so much in the adoption of any particular method of electric traction, however superior, as it does in enlisting and utilizing services which other enterprises can be made to contribute. Separately, they may be only just paying their way, but combined, it will probably become possible to make an exceptional success of both.

Let me clear the way, in the first place, by removing any misconceptions there may be that the circumstances and conditions of the town of Hull relative to electric traction are unique in their nature. Such is not the case. There are, indeed, dead level roads and these certainly offer many advantages to accumulator traction which might not apply elsewhere. On the other hand there are many dock bridges which open and close and these present a mechanical difficulty which, however, can be surmounted without stopping the running of the cars, as it is very seldom that two of the docks' gates are open at the same time. But in point of fact, these special features do not affect the general question we are considering.

The basis on which I now propose to consider the subject of my paper has for its essential feature the possibilities in economical management and working which are within the power of municipal corporations. Municipal corporations are, in this respect, widely different from private or public companies, inasmuch as they are responsible, not for one business alone, but for many and varied undertakings. A public company restricted to the narrow limits of its single enterprise will, of course, select a system which is likely to show the lowest working costs, and such a selection will be to the best interests of the shareholders. But municipal corporations should have wider views. They have many businesses to conduct in the interests of the ratepayers. The system, therefore, to be selected by a municipal corporation is that which has the greatest tendency to enhance the value and increase the profits of other departments of the corporation. The cost of working, considered from this point of view, though perhaps actually heavy and large, may be relatively small.

I will now proceed to a short general analysis of the combination of refuse destruction, electric tramway service and electric lighting on the low tension system.

For the purposes of illustrating the general arrangement, I beg to draw your attention to the accompanying diagram. The large circle of lines represents the tram-car route, with the destructor station on the confines of the town, and the electric lighting station in the center.

POWER FROM REFUSE DESTRUCTION.

It is now a generally admitted fact that, given modern improvements for the generation of steam, some power can be obtained from refuse destruction. The publication of Mr. Charles Jones' book on refuse destructors has thrown light upon a subject which has hitherto been neglected by engineers, while the popular articles by Mr. Thomas Thomlinson have brought new possibilities before the electrical engineer.

To sum up the whole of the evidence contained in Mr. Jones' work, I find that out of 50 destructors at work, destroying from three and a half tons to ten tons per cell, the power obtained varies from five to seven horse-power per cell. This power has been generated under conditions for raising steam which have had to be, and will always have to be, modified and made compatible with the complete destruction of the refuse from a sanitary point of view.

The question, therefore, arises, What is the best use to which this power may be put? Hitherto it has found its solution for the most part in the working of mortar mills and stone breakers, or as a subsidiary power to an electric lighting station, possibly producing sufficient power for day-load purposes. These applications, however, while their advantages are not denied, do not use one-half of the available power, for the simple reason that most destructors are in operation the whole of the 24 hours, and the hot gases are at night perforce turned into a by-pass flue and so far wasted.

Under every scheme which is at present being tried there is as much power lost as utilized, but in the scheme to which I wish to draw your attention this evening the whole available power is laid under contribution day and night without intermission, as far, of course, as the usual engineering considerations will allow.

Now this is a very important point, upon which I wish to lay particular stress.

The difference, therefore, between my proposition and the use to which the power has already been applied, or, in other words, between my scheme and the schemes for utilizing the power for the day load of electric lighting stations, may be stated as the difference between horse-power and horse-power hours. The available horse-power with a variable demand is practically an unknown quantity, whereas the utilization of the available horse-power continuously over a stated and prearranged number of hours is a definite quantity and one upon which calculations can be made.

The suggested probable economy in the first case is a very doubtful matter, but under definite conditions the problem is resolved into calculating the usual losses which always occur through the transmission and transformation of power. Where the power is utilized as an auxiliary to electric lighting one other very serious drawback occurs which I just briefly point out in passing. I refer to the "standing by" of the main boilers and their consequent daily cooling during the time that the destructor boilers are supplying steam. The period of the earning capacity of the former is thereby rendered very short, and the increased economy of working by the combination is practically neutralized by being swallowed up in interest on the capital outlay. In addition the boilers are deteriorated by being alternately cold and hot.

APPLICATION OF THE POWER.

In a paper of this description it is quite unnecessary to deal in a detailed manner with all the applications to which it is possible to put the power derived from the destruction of refuse. The effectiveness of this power depends largely on the quantity and nature of the refuse to be destroyed and this again varies enormously in different towns. But I have already pointed out that according to the best authorities and our own knowledge of the relative value of fuels as heat producing agents, it must be admitted that a refuse destructor cannot be depended upon without the extraneous aid of other fuel to provide its maximum power at any given time. I must not be understood to say that an advisable and economical arrangement might not be devised where coal, for instance, might be used as an auxiliary fuel, but taking the refuse destructor on its own capabilities alone, we may safely assume that as a power producer it is limited to this extent; namely: That it yields a mean steady power only; or in other words, that it cannot be depended upon for sudden emergencies. We must take it for granted, at the outset, I think, that in every case the refuse destructor may be depended upon to provide a certain minimum power. This minimum power must be adequate to meet the demand made upon it, or, in other words, the plant to which it is proposed to apply the power must be so designed and arranged that at no time shall a sudden and unexpected demand be made upon the destructor which it is incapable of meeting.

In the town of Hull about 250 tons of miscellaneous refuse are destroyed weekly. This is a small quantity compared with that of other provincial towns. A large portion is composed of dry shop refuse, such as paper, straw, wood and ashes, while it is not an infrequent occurrence to have to destroy whole ship cargoes of condemned fruits, vegetables and fish. From observations taken I am well within the mark in estimating that with the necessary alterations to the present destructor we could obtain a continuous power of 45 independent horse-power. This 45 independent horse-power would give at least 40.5 electric horse-power at an efficiency of electrical machinery of only 90 per cent, or a continuous output of 400 amperes at 75 volts, for it must be borne in mind that under the scheme I am unfolding the electrical machinery would be designed to always work at full load. This arrangement would be amply sufficient to charge batteries of 25 cells, always keeping a certain number of batteries in parallel according to the rate of charge.

Of course, the number of batteries and their size would depend upon the size of car to be propelled, and I have already pointed out that the power at the destructor station can be supplied continuously for the 24 hours. This would be equivalent to doubling the capacity of the plant, as the batteries charged during the night would meet the requirements of the tram-cars for half the succeeding day. This power would charge a sufficient number of accumulators to run from about one-half to three-quarters of the trams according to whether the service consisted of 12 or more trams in the hour on the different routes. The remaining portion could be conveniently and economically provided for by supplying another charging station with power from the machines at the central electric lighting station, which machines would be available for this purpose during the day or night, excepting only at the time of maximum demand.

In considering the whole matter I had brought before my notice what had already been done with regard to thermal storage. There may be possibilities in thermal storage which are not yet matters of common knowledge. This, of course, may be especially the case where sudden demands for abnormal power for short periods would be made, as in that case the steady and continuous power generated might be stored.

But the only reliable working statistics we have are those connected with a steam tramway in India where the engines obtain sufficient power for one journey from a reservoir of high pressure steam. It can easily be seen, however, that the hot climate of that country must conduce very largely to the success of the system as radiation must be at a much less rate than would be the case in England. Indeed, an English Winter might render such a system quite inoperative.

Reverting to the two other alter-

natives, namely, the overhead cable or trolley system and the underground conduit system, the advantages of which mainly consist in economy of working (plant for plant), I may mention a few of the disadvantages (and consequent expense) attendant upon these systems which do not occur with the use of accumulators:

1. Irregular demands upon the generating plant.
2. Greater wear and tear of the machinery.
3. Capacity of generating plant must be equal to all possible demand upon it.
4. Plant standing idle when cars are not running.
5. Stringent requirements of the Board of Trade as to insulation and periodical tests.
6. Greater original outlay of capital.
7. Impossible to economically use the power which the electric lighting station might contribute during the day.
8. Inability of the refuse destructor station to supply the whole of the power required, hence,
9. Necessity to erect independent central generating station to supply additional power required.
10. For reasons contained in 8 and 9, very little, if any, advantage in point of economical working would arise from the aid of the refuse destructor.

The foregoing list of disadvantages is serious enough, but over and above all these I may point out that the power from a refuse destructor when applied to an overhead or underground system would only complicate what is merely a simple scheme. In fact it would be more economical to put down one complete generating plant for the tram-cars, appropriating the destructor power to some other purpose, where, as I have already mentioned, the whole power obtainable as calculated in horse-power hours would be turned to more remunerative account.

The most serious item to be considered is, after all, that of capital expenditure. A heavy original outlay runs away with so much of the profit in the case of municipalities in providing interest and sinking fund. Now the capital expenditure, be it observed, for the complete equipment of accumulator cars, is usually from 50 per cent to 75 per cent only of that required for the overhead cable system according to the track mileage. If the accumulator system can be arranged and worked so that the entire depreciation of the accumulators can be written off per annum out of lower working costs than are possible with either of the other systems, then it is clear that traction by accumulators would be the most highly remunerative system of any form of traction yet devised.

THE ADVANTAGES OF ACCUMULATORS.

I have already pointed out that one of the greatest advantages of accumulators for electric traction purposes lies in the fact that the power of a refuse destructor may be utilized to the full, and that in consequence the cost of generating the power (both with regard to fuel and labor) would be extremely small. But if the scheme ended here the advantages would perhaps scarcely justify the especial prominence I have given to it. It is only as the destructor is brought into combination with the central station electric lighting plant that the matter becomes supremely worthy of consideration. I am of opinion, in the first place, that no town has sufficient refuse to supply of itself the whole power required to run its tram-car service, whether by accumulators or other system. Even supposing that sufficient power could be so obtained, it would necessitate an additional capital outlay on buildings, machinery, etc., so great that it would practically be the same as for an electrical station independently worked. But where merely horse-power is available the necessary plant could readily be accommodated. The chief function and value in that case would consist in its being a "relief" station, which would obviate the running of all cars to one point only for recharging purposes. If there were more than one refuse destructor in a town, each, of course, could be used to form a relief station according to the number and frequency of the cars.

I have so far endeavored to point out the advantages and uses of accumulators in connection with the utilization of the power derivable from refuse destruction. I now proceed to consider a far more important matter; namely, the advantages arising from charging accumulators for electric traction by means of the available and otherwise idle plant at a low tension electric lighting central station.

These advantages are based upon the following fact:

The cell charging can be stopped at the hour when the heavy lighting load comes on and the full capacity of the plant can then be used for lighting purposes.

This at the first glance may perhaps appear a very small advantage, but its full significance consists in the fact that it provides a day load for the central electric lighting station. I have no need to here describe the modus operandi; suffice it to say that low tension central stations are designed for charging accumulators, and by means of independent connections those machines not running in the day or night time could be employed in charging separate accumulators for the tram-car service. As the electric lighting load came on so the different machines would be transferred from the tram-car plant to the main switchboard and vice-versa.

The question now is, what does this arrangement actually mean both to the tram-car and the electric lighting enterprises?

The tram-car enterprise would benefit in many ways; viz.:

1. Less capital would be required, not having to provide independent dynamos and engines.
2. There would be, of course, correspondingly less interest and sinking fund liabilities.
3. Such expenditure as would fall under depreciation of plant, repairs, rents, rates and taxes, wages of boiler and engine attendants, etc., would be equitably divided between the electric lighting and the tram-car concerns.
4. The management of the tram-cars, whilst under the supervision of an official and staff, would also be controlled by a separate committee which would act conjointly with the electric lighting committee.

It must be quite clear, therefore, that co-operation must very largely reduce the working costs of a tram-car system. The cost per unit, whether we calculate per horse-power hour, per car mile, or on any other basis, must be greater where the whole cost of management and working has to be borne by the tram-car service alone, than will be the case where by using the resources of the electric lighting plant handsome profits are made in what I may term "spare time."

To what extent this co-operation might be developed it is difficult to say, but the fact that each enterprise would save considerable expense to the other is perfectly obvious.

With regard to the electric lighting concern the acquisition of a substantial day load is of the utmost possible consequence. For the purposes of this paper it will be better to assume that this department merely charges (as an electric lighting enterprise pure and simple) for the current which it can generate and sell. That is, I do not wish to complicate what I have to say by assuming any arrangement between the electric lighting and tram-car committees with regard to sharing the proportions of the costs under the various items common to both enterprises. It will be sufficient if we assume that:

1. The electric light committee retain their independent position and make a definite charge per unit for all current supplied.
2. That this output is merely considered as a day load.

The endeavor to solve the problem of a day load for the central station has resulted in the suggestion of many different methods, but most of these methods at the best would only make use of a very small proportion of the available power. In common with other central station engineers I have had the problem before me, and a few months ago I endeavored to show in a contribution to the ELECTRICAL REVIEW how far the various methods of charging the public for

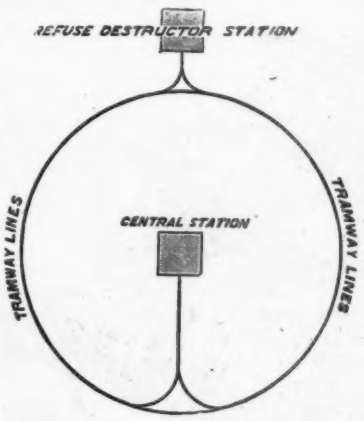


DIAGRAM SHOWING LOCATION OF DESTRUCTOR STATION, LIGHTING STATION AND TRAMWAYS.

electricity from a central station tended in the direction of encouraging a day load.

In the course of my analysis in that article, under the heading of "The Works Cost," I dealt with the available horse-power of a central station, and I cannot do better than read the paragraph: "Let us assume that the available horse-power of a station is 1,000. Multiplying this by the total number of hours (8,760) in the year, gives 8,760,000 horse-power hours. Assuming, on the other hand, that the full capacity of the plant is used on the average three hours only per day, then the total number of actual horse-power hours = 1,095,000, or one-eighth of the absolute capacity. As an assumption this errs, if anything, on the same side, as very few central stations, in fact, are yet reaching the one-eighth of their full capacity in the year. We must now consider this unused available horse-power side by side with those items of cost which would not practically be increased in the sum by generating seven-eights available output.

"The items are as follows:

"1. Wages (except outdoor staff).
"2. Salaries.
"3. Repairs and maintenance.
"4. Rents, rates and taxes.
"5. Sinking fund.
"6. Interest on capital.

"It will readily be admitted that these are the expenses which really affect the cost per unit delivered to consumer. Yet these remain, to all intents and purposes, constant; practically neither more nor less, even when the plant is being utilized to the full. The result, of course, is that where the output is increased eight-fold, the rate of cost per unit delivered, so far as these items are concerned, will be reduced to one-eighth."

The remarks I have now quoted with regard to the methods of charging for current are equally true in reference to the arrangement which we are now considering. As an example, I will give actual figures from the working of the electric lighting station at Hull. These may be absolutely depended upon, as we weigh all coal, all ashes and measure everything consumed. The units generated and delivered are checked in four ways: First, by Aron meters in the circuit from the dynamo to the switchboard; second, by the working out of daily load curves taken from readings on the ammeters; third, by Edmondson meter in the main omnibus bars between the switchboard and the several feeders; fourth, by quarterly comparison of the consumers' meter readings. All these we find agree within a small percentage.

Our lightest weekly output during this Summer cost us .97*d* per unit delivered (not generated), including coal at 14*s* per ton, and oil, water, waste and all stores. Our heaviest weekly output during this Winter has cost us .60*d* per unit for the same items.

Now with regard to the standing charges just referred to, if we multiply the heaviest weekly output by 52, or in other words, if we assume the maximum weekly output as the average weekly output I find that the proportionate cost of the standing charges comes to, 1.84*d* per unit. Adding both these costs together, that is, the generating cost and the standing charges cost, we get:

Generating cost.....	.60*d*
Standing charges cost.	1.84*d*
Total.....	2.44*d*

as the representative total cost per unit for one week, and I have no need to add that I only wish the figures were true for every week in the year.

The maximum electrical power used during this model week was 450 for an average of three hours per day, or 9,450 electric horse-power hours out of a possible 75,600.

Now a minimum number of small cars, say 30, averaging 10 electric horse-power each, would give (neglecting charging losses) 300 electric horse-power which for 90 hours in the week is equivalent to 27,000 electric horse-power hours, or an increased output of at least three times the usual quantity. As the power required by the tram-cars would not vary with the season of the year, but would remain fairly constant, it is possible that this supply would form by far the largest factor of the output for some years.

You will at once see my object in giving you these figures. The generating cost of course will remain the same; viz., .60*d*., but the standing charges cost will be reduced to one-third, and the gross cost per unit becomes 1.21*d*. only for all current generated.

This figure gives us a very high efficiency; in fact, the very highest efficiency which has ever been obtained from any electric lighting central station in the United Kingdom, or I venture to say anywhere in the world. This demonstrates clearly what the co-operation of accumulator cars will do for an electric lighting station, and it may be definitely stated that the combination guarantees a better load factor for every week throughout the year than is obtained by the highest weekly output of the electric lighting alone. It would mean that an enormous profit would accrue to the electric lighting business itself, if only 3*d*. per unit were charged, and the first possibility

which is immediately suggested is that of the great reduction which might be effected in the usual price per unit for current. But we must not forget that this possibility is essentially due to the creation of a magnificent day and night load. I am of opinion, therefore, that the standing charges rate should not be divided equally between the tram-car and the electric lighting concerns, but in the inverse ratio of their demand in units throughout the year. In thus charging the users of the electric light with the larger proportion of the standing costs, it would be possible to confer a still greater benefit on the traction enterprise by bringing the whole of its charges to within a 1*d.* per unit. This price, which includes interest and sinking fund, capital, wages and power, as far as the generating machinery is concerned, will be found to be a much lower figure than has ever been obtained with any system.

The foregoing arrangement does not necessitate that the traction accumulator cells should be charged at the electric lighting central station. The nearer the charging depot is to the central station, so much the better, in order to avoid loss in transmission and outlay in cables, but it is not an indispensable condition. A special set of cables could readily be laid to any convenient spot. The system of low tension supply will generally allow and admit of additional cables being easily laid to any point within the area of distribution.

You will have observed that the arrangement therein suggested is essentially based upon those facts of which we, as engineers, are certain. I have endeavored to entirely eliminate dubious or insufficiently tested possibilities such as thermal storage, and I have avoided the unnecessary procedure of basing my proof upon comparisons of the working cost per car mile of the different systems, as such figures are generally misleading, and in most cases do not form any proof at all. Admitting and including the heavy depreciation of the accumulator plates, it has been my object to show how accumulator traction can be worked cheaper and more satisfactorily than the other two systems. Hence my ideas are placed before you rather in the abstract than in the concrete. With reference to my figures representing the power obtainable from our refuse destructor, or, for that matter, from any other refuse destructor, providing the requisite quantity of refuse is present, I merely wish to point out that Mr. Jones, of Ealing, estimates for the same number of cells, destroying the same quantity of refuse as at Hull, a continuous power of 50 independent horse-power, while I have placed my figures at 45 independent horse-power. The refuse at Hull is, in fact, of a drier and more combustible nature than that at Ealing, so that my estimate may be taken as well within the mark. I have had the advantage of seeing the Ealing destructor works, and my assertions, therefore, may be taken with every degree of assurance.

I have now endeavored to point out, or indicate in this paper, a few features in connection with municipal enterprise, which are well worth consideration. I do not for a moment say that the particular instance I have given, and which I have found would be so particularly to our advantage at Hull, is one which in all respects would be found equally advantageous in other towns. But it is the co-operation of departments under municipal control which might be arranged without in any way interfering with the carrying out of the regular or specific work which each department had been created to perform.

The tendency, of course, is already in this direction, and many towns are attempting to make some use out of the destruction of their refuse.

But there is no reason why such combinations should not be more extensively made, and to this end I have endeavored to show accumulators, as applied to electric traction, can at the present time be turned to remunerative account.

TELEPHONE NEWS AND COMMENT.

A Bell telephone line has been built between Butte and Stuart, Neb.

A telephone line will be built between Rockville and Sandy Spring, Md.

The Inter-State Telephone Company will begin at once the construction of a new telephone system at Kansas City, Kas.

Representatives of the Harrison company are looking at Cincinnati with longing eyes and hope they can get an exchange into Captain George N. Stone's stronghold.

The Inter-State Telephone Company is preparing to install an exchange at Fort Plain, N. Y. Connections will be made with the following towns: St. Johnsville, Canajoharie, Little Falls and Dolgeville.

The output of the American Bell Telephone Company for the month ending December 20 was as follows:

	1894.	1893.	Increase.
Gross output	8,472	4,892	3,580
Returned	6,688	6,126	562
Net output	1,784	def. 1,234	3,018
Since December 20:			
Gross output	89,493	81,418	8,075
Returned	72,318	65,488	6,880
Net output	17,175	15,980	1,195

The Western Electric Company, of Chicago, on December 10, brought suit in the Federal Court at Springfield, Ill., against the Decatur Telephone Exchange for an accounting. The Decatur exchange is about to begin business with the instrument manufactured by the Harrison Telephone Company. An infringement of patent is claimed.

All the wires, poles, cross arms and other property of the American Telephone and Telegraph Company in the State of Connecticut were attached on December 20 in a suit for $20,000 damages brought by B. F. Squire and his wife, of Monroe, Conn. The claim for damages is based upon the alleged negligence of the servants of the defendants in leaving a large pile of old wires that had been removed from the poles near the highway in the town of Monroe, at which the horse which Mrs. Squire was driving on her way to church one Sunday in November last took fright and ran away. She and her daughter were thrown out of the carriage, both narrowly escaping death. Mrs. Squire, it is claimed, is injured permanently.

The Bell Telephone Company, of Buffalo, has not yet made the slightest move to obey the orders of the city of Lockport, N. Y., to get out forthwith, which were reiterated on December 10, nor does it apparently intend to make the slightest move in the direction of compliance. The city, however, appears to have no intention of enforcing its command and thereby leaving itself without any means of telephonic communication. It is doubtful, moreover, whether the company will not be in the better position, rather than the city, by reason of this delay in enforcing the resolution, provided, that is, that the city really means business and intends by and by to contract with the new company not yet fully organized. The new Citizens' Mutual Company has reached the stage of electing officers, choosing ex-Mayor Thomas Oliver, an anti-monopolist and fighter from 'way-back, as president; W. W. Trevor as secretary; and J. A. Ward as treasurer.

THE PIGODEON. (Patent applied for.)

(*By Courtesy of Scribner's Magazine.*)

SHE (*log.*): "I admit the perfect tones of the instrument, but may I ask on what grounds you apply for the patent?"
THE PROFESSOR (*log.*): "Easiest thing in the world, my dear girl; the application of the electric touch to each pig's tail, with the consequent duration of squeal."

TELEPHONE VIEWS FROM WASHINGTON.

THE BERLINER DECISION AND WHAT IS THOUGHT OF IT AT THE NATIONAL CAPITAL BY PATENT ATTORNEYS AND OTHERS.

To the Editor of Electrical Review:

Judge Carpenter's decision in the Berliner case has caused much excitement and indignation among the Washington patent attorneys. It practically declares that if any attorney *permits* the Patent Office to delay action, for any reason, upon their client's application the patent will be void. On the other hand the Patent Office examiners do not take kindly to the idea that they are to be subject to the dictation of the attorneys. They know the law and the rules of the office and will continue to obey them.

The friends of Mitchell, Simonds, Butterworth and other commissioners, who were in office while the Berliner application was pending, are quite indignant that such a man as Carpenter should officially stigmatize them as parties to a fraud practiced upon the public.

The solid sense of the men best qualified to judge is that the decision will never stand. Some years ago Justice Clifford of the United States Supreme Court prepared an exhaustive opinion on the main question involved in the Berliner case, and decided that an inventor is not responsible for delays in the office.

So far as the other point is concerned, the opinion is expressed by uninterested lawyers that if anybody except Berliner had held the second patent, or if anybody except the Bell Telephone Company had owned it, the question would never have been raised. The decision plainly shows that Judge Carpenter did not confine himself to the adjudication of the rights of an individual who claimed protection from the government for his invention, but that he undertook to use the government suit against Berliner as a club with which to smash the whole Bell Telephone concern. It is one of the peculiarities of the people to abuse an inventor for all their grievances, real or imaginary, against the corporation which happens to use his invention.

Many a patron of the Western Union Telegraph Company who thinks their tariffs too high, or whose telegram has been delayed in transmission, immediately wants to run out to Central Park and throw mud at the statue of Professor Morse. In this case Judge Carpenter seems to lay up against Berliner and his patent all the shortcomings of the Bell company and its agents. The general impression is that he has fully proven his right to the title bestowed on him by General Butler, of "an inferior judge of an inferior court."

On one point there seems to be a good deal of misapprehension. The Berliner patent has not been canceled, and it will not be canceled, at least, until the Court of Appeals reviews the case. Meanwhile the Bell company holds the patent and has a right to operate under it. Infringers should take the decision simply as legal advice, for what it is worth, and they will do well to consult their own lawyers before making any radical move.

The announcement of Carpenter's decision was hailed with delight by many persons, by whom it was regarded not only as the death of Berliner's patent, but as the destruction of the "great monopoly." Of these persons there are three classes: One is made up of exchange subscribers dissatisfied with their treatment, in too many cases for good reasons. Another class includes persons who might have made a fortune by investing in Bell Telephone stock, but who let the opportunity slip. The third class is a large one and embraces those who are still ambitious to make a fortune in the telephone business. The Review's Chicago correspondent, Mr. Keelyn, expresses their feeling with beautiful poetic pathos in saying the decision "removes the undefined fear of monopolizing oppression, and capital will not hesitate to enter this lucrative field, from whence *a waiting future stretches forth its welcoming arms.*" The arms most conspicuously stretched forth just at this time are those of telephone schemers reaching after the capital of gullible speculators. The promoters of the numerous schemes declare in one breath that telephones are public property and in the next that *they* hold patents which carry valuable rights. Taking the community by and large, comparatively few persons care which way the matter goes. Telephonic communication is a necessity; nobody wants two exchanges in one city, and the success of the business must depend, not upon patent rights, but upon efficient and useful service and fair dealing.

Berliner is busy turning out gramophones for his customers and will not be interviewed. Professor Bell is spending the days of this holiday season frolicing with his children and sitting up nights devising ways to promote the welfare of deaf mutes. Dr. Freeman is loaded up with work for his clients and has no time to talk to the newspapers; and he would not talk even if he had nothing else to do. One thing the Bell Telephone Company and its associates can always be counted on for—they attend strictly to business and show no signs of going out of business because their patents cannot run forever.

Geo. C. Maynard.

Washington, D. C., December, 28.

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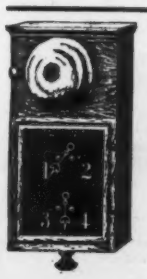

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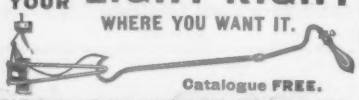

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